PAPERS on Economics & Evolution

0808

The Growth and Decline of Small firms In Developing Countries

by

Alex Coad
Jagannadha Pawan Tamvada

The *Papers on Economics and Evolution* are edited by the Evolutionary Economics Group, MPI Jena. For editorial correspondence, please contact: evopapers@econ.mpg.de

ISSN 1430-4716

© by the author

Max Planck Institute of Economics
Evolutionary Economics Group
Kahlaische Str. 10
07745 Jena, Germany
Fax: ++49-3641-686868

The Growth and Decline of Small firms in Developing Countries*

Alex Coad† Jagannadha Pawan Tamvada ‡

October 27, 2008

Abstract

Empirical work on micro and small firms has focused on developed countries. The little work that exists on developing countries is all too often based on small samples taken from *ad hoc* questionnaires. The census data we analyze are fairly representative of the structure of small business in India. Consistent with prior research on developed countries, size and age have a negative impact on firm growth in the majority of specifications. The decision to export is a double-edged sword – if successful it can accelerate the growth of successful firms, but it can also increase the probability of decline. While proprietary ownership results in faster growth, enterprises managed by women are less likely to grow and more likely to decline. Although many small firms are able to convert knowhow into commercial success, we find that many others do not have any technical knowledge and some are unable to use it to their benefit.

JEL codes: L25, L26, 012

Keywords: Entrepreneurship, Developing countries, Micro and Small businesses, Firm growth, Firm age, Barriers to growth, Declining firms, Female entrepreneurs

*We thank Thomas Gries, Ayal Kimhi, Wim Naude, and participants at the UNU-WIDER project workshop on 'Entrepreneurship and Economic Development' in Helsinki, August 2008, for many helpful comments. We also thank the Ministry of Small Scale Industries, Government of India, for providing us the firm level data used in this paper. The usual caveat applies.

†Max Planck Institute of Economics, Evolutionary Economics group, Kahlaische Strasse 10, Jena 07745, Germany. *Email: coad@econ.mpg.de*

‡Max Planck Institute of Economics, Entrepreneurship Growth and Public Policy group, Kahlaische Strasse 10, Jena 07745, Germany. *Email: tamvada@econ.mpg.de*

1 Introduction

Small firms play critical roles in the development of industries and economies. In developed countries, entrepreneurial small firms play an important role in introducing new products and new techniques into the market, through technological innovations (Pavitt et al., 1987; Acs and Audretsch, 1990). The traditional Industrial Organization literature has also suggested that entry of new entrepreneurial ventures ensures market contestability, which is a source of competition that keeps markets functioning well.[1] Another advantage of small firms is that they are associated with more flexible production routines (You, 1995).

Even in developed countries, however, many entrepreneurs are not true entrepreneurs, in the sense that they do not bring innovations or bring about reform in stagnant markets (Santarelli and Vivarelli, 2007). Many enter for less noble reasons, such as overoptimism on the part of the founder, the pursuit of a relaxed lifestyle, or the flight from unemployment. In fact, many entrants are far less productive than incumbents (even taking into account their liability of small scale). The concept of new firm entry gathers together a particularly heterogeneous group of enterprises.

In developing countries, however, micro and small firms exist for different reasons. One major factor is that they offer individuals a livelihood and a source of independent revenue. In many cases, new small businesses are founded as a last resort rather than as a first choice (Beck et al., 2005). It has even been argued that, in the case of India, better educated individuals are quick to leave self-employment and pursue alternative career paths, whereas less educated individuals have fewer opportunities to leave self-employment (Nafziger and Terrell, 1996). Workers in such enterprises are typically badly paid, or may even be unpaid family members. The work is typically labor intensive, but levels of labor productivity (and also capital productivity) are typically low (Little, 1987). Formal financial markets are of limited use for these small businesses, and so they remain

[1] In reality, however, the competitive threat of new entrants appears quite limited because they enter at a small scale and many die shortly afterwards (Geroski, 1995).

small and do not become capital intensive. For such firms, "the entrepreneur must be his own banker" (Leff, 1979, p. 48), and must rely on informal capital markets (such as personal savings or small loans from friends and family) for financing (Kozan et al., 2006; Allen et al., 2006).

Firms that enter small often remain small, because they face formidable barriers to growth. It has even been suggested that it is more common to find the entry of large firms than smaller firms growing large (Van Biesebroeck, 2005). Indeed, several authors have commented on the "missing middle" in the firm size distribution that arises when large firms grow larger but small firms rarely grow themselves into the next size category (Tybout, 2000; Sleuwaegen and Goedhuys, 2002). These enterprises remain small for a whole host of reasons such as continuing financial constraints, transport costs, limited infrastructure, lack of suitable management resources, and also the desire to stay small and informal so as to avoid taxes. Micro and small firms in developing countries generally do not correspond to the most efficient scale of production (Little, 1987), yet they allow people to be independent and make a living. Female entrepreneurs play a considerable role here. Female entrepreneurs in developing countries are less ambitious about growth and financial performance than their male counterparts (Singh et al., 2001; Hisrich and Ozturk, 1999). They are less concerned about achieving their high-growth business aspirations than they are about providing for their families. These female-led enterprises are typically smaller and pay less to their employees (Singh et al., 2001). There is ample evidence that female enterprises in developing countries experience slower growth than male enterprises (McPherson, 1996; Mead and Liedholm, 1998) presumably because of conservative social values and attitudes concerning women in industry (El-Namaki, 1988).

Given the special role of small businesses in providing for the poor, and also the obstacles to growth that they encounter, developing countries have often taken a favorable position towards micro and small firms. India has, historically, been especially supportive of its small enterprises (Little, 1987). For example, the Indian government has granted

exclusive production rights of certain goods and services to Small Scale Industry (SSI) businesses and, even though the Indian economy has undergone considerable deregulation in recent years, the production of many goods continues to be reserved for small businesses.[2] Government support for micro and small firms, however, is not uncontroversial.[3] While some view entrepreneurship as the 'prime mover' which can initiate the development process (Leff, 1979), or as a means to attain a more efficient allocation of resources (You, 1995), others focus on the low productivity of these enterprises and are pessimistic about the role they can play in economic development. As such, there is some skepticism about the economic foundations of government support of small enterprises – "India is . . . exceptional in the extent and range of its policies that directly support SSEs. . . . They have been romantic, rather than economic." (Little, 1987, p. 232).

Following on from the debate about the role of the small enterprise sector in developing countries such as India, theoretical work has found it useful to distinguish between firms on the basis of their growth performance. Roughly speaking, the intuition is that high productivity entrepreneurial firms will grow fast, while those who turn to self-employment simply because they have no other option are more interested in survival and remain at a small scale. For example, Rogerson (1996) distinguishes between 'survivalist' and other small firms, while Autio (2008) separates high aspiration entrepreneurs from low aspiration entrepreneurs. It should be noted that these classification schemes rest mainly on different growth performances of small firms.

Given the theoretical interest in the growth of small enterprises in developing countries, the aim of this paper is to provide novel empirical evidence on the matter. We add

[2]Most of these items are foodstuffs and consumer products. For a complete list of protected items, see http://www.smallindustryindia.com/publications/reserveditems/resvex.htm.

[3]A recent contribution to this debate by Beck et al. (2005) examines the role of the SME sector in 45 countries (not including India). They begin by reviewing the prior literature and conclude that "firm-level studies do not provide an empirical foundation for subsidizing SMEs." (Beck et al. (2005, p. 201)). In their empirical analysis, they observe a robust positive relationship between the relative size of the SME sector and economic growth, although the SME-growth relationship is not robust to the use of instrumental variables to control for endogeneity. Put differently, they write that "although a prosperous SME sector is a characteristic of flourishing economies, we cannot reject the view that SMEs do not cause growth." (p. 224). They also fail to observe any significant relationship between the size of the SME sector and poverty alleviation.

to the existing literature by providing new insights into the nature and dynamics of small businesses in India. We exploit an enormous database that comes from a nationwide census survey conducted by the Indian government. Within this dataset we are able to explore the growth performance of types of small firms that are relatively unheard-of in the existing literature, including traditional sector firms (including firms whose principal source of energy is firewood) and older small firms (often dubbed 'lifestyler'[4] firms). Although we are able to detect minor inaccuracies in the dataset, we apply econometric techniques that take these inaccuracies into consideration. Section 2 describes the government census on small businesses that we analyze in Section 3. Section 4 concludes.

2 Database and summary statistics

2.1 Background: the Indian economy

The rapid transformation of the Indian economy from a state-controlled licence regime to a liberalized regime is widely documented in the literature. We refer the reader to Aghion et al. (2005), Kochhar et al. (2006), and Rodrik and Subramanian (2005) for a relevant discussion.[5] A peculiar characteristic of Indian industry, as Kochhar et al. (2006) note, is the greater importance given to skill-intensive rather than labor-intensive manufacturing and to industries with higher than average scale "though the average firm size within industries is unusually small."

Table 1 presents some development and poverty indicators for India. India is the second largest country in the world with a population exceeding one billion. The population is growing at an annual rate of 1.5% and is expected to be the most populous country in

[4]'Lifestyler' firms, it is supposed, have less desire to grow, but their owner-managers prefer to keep them at a small size to keep them more manageable and to secure a stable lifestyle from them (Hay and Kamshad (1994)). It seems to us that little work has been done on 'lifestyler' firms so far (even in the literature concerning developed countries), for several reasons. First, it is not easy to get data on small firms. Second, it is not easy to get data on firm age. Third, researchers have tended to assume that all firms want to grow and have tended to overlook this category of firms.

[5]For a examination of the associated gains in industry wide productivity and competition see Krishna and Mitra (1998) and Balakrishnan et al. (2006).

the world in near future. It is one of the most dense countries in the world with as many as 363 people inhabiting a square kilometer on an average. India's per-capita GDP is 3100 dollars, close to one third of world's average. 35.3% of India's population survives on less than a dollar a day, the official poverty line defined by the World Bank, and more than 80% of its population lives on less than two dollars a day. The average life expectancy is 63 years for men and 64 for women. The adult literacy rate is more than 60%. As seen in the table, services have the major share of value added as per cent of GDP.

2.2 Database description

The main source of data for examining the determinants of firm growth is from the Ministry of Small Scale Industries in India. We use firm level data from the third census of registered small scale firms. This census was conducted in 2002-2003. This rich dataset has data on 1.5 million firms. We restrict the sample to firms in the manufacturing sector. Each new firm was asked a series of questions such as its year of initial production, the sector of its operation, the source of its technical knowledge and energy, the gross output for three years, ownership type and if it experienced decline over the last three years. If the firm experienced a decline, it was asked the causes for its decline. The sample contains new small firms (including those that are growing rapidly) as well as old firms that have not grown beyond the size threshold despite their age.[6]

In theory, one might be concerned about the statistical effects of having an upper threshold on the sample. At the top of the distribution, near the threshold, relatively large firms may grow or decline. Growing firms might be excluded from the sample (because they exceed the threshold) whereas declining firms would stay in the sample. This might lead to a downward bias on the growth rates of large firms. In practice, however, this does not seem to be an important issue. First, only a very small proportion

[6]The Ministry of Small Scale Industries defines firms having an initial investment less than 10 million Indian rupees as small and medium sized enterprises.

of firms are close to the upper size threshold. Second, firms are sorted according to their initial size (i.e. size at the beginning of production) rather than their final size, such that firms that are large enough to be near the threshold will not be censored even if their final size is above the threshold. Third, we repeated the analysis using a different (lower) size threshold and we obtained similar results. Audretsch and Tamvada (2008) is the only other study that uses this unique database; they study the determinants of the size of new firms.

Previous work on entrepreneurship in developing countries has tended to use small samples obtained from correspondence with entrepreneurs through questionnaires. Undeniably, this approach has found valuable new results where data was sparse. In our paper, however, we use a government census, and there is a very high response rate. Our work thus complements previous work by providing estimates based on a large database. We do not focus on the details and specificities of particular regions or categories of businesses, as other work has done, but instead provide an aggregate view of the characteristics of all Indian firms. Previous work focusing on small samples can thus be compared to our estimates. However, the estimates reported here have an advantage over much previous work because our large sample size ensures representativeness of our results.

The main variables in the empirical analysis include age of firm, size (employment, gross output), ownership type, source of technical knowhow and growth - calculated as log-differences of size. The control variables include industry dummies, sources of energy and if the enterprise is an exporting unit and a woman enterprise. In keeping with previous studies, our measure of growth rates is calculated by taking the differences of the logarithms of size:

$$GROWTH_{it} = log(X_{it}) - log(X_{i,t-1}) \tag{1}$$

where X represents firm size and is measured in terms of gross output.

2.3 Summary statistics

As descriptive statistics in Table 2 suggest, the average age of a firm in the sample is 13.8 years. The average annual growth rate is between 6-7%. Single ownership is the most prevalent form of firm ownership structure. 86.2% of the firms are owned by proprietary owners and 9.5% of the firms are partnerships. Only 8% of the firms are managed by women entrepreneurs. While 70% of the firms in the sample have electricity as the main source of power, 19.5% firms do not use any source of power, 6% of firms depend on coal and oil and 3.2% of firms use non-conventional and traditional sources of power such as firewood.

In contrast, Table 3 shows the summary statistics for firms that are classified by the census questionnaire as 'declining firms'.[7] These firms are contracting by 10-14%, on an average, annually and are slightly older than the other firms. The distribution of ownership structure reflects the broad patterns seen in Table 2, but the tables together show that while proprietary owners are less likely to experience declines, partnerships are more likely to decline. Firms having non-conventional and traditional sources of energy such as firewood are also more likely to be declining.

We do indeed have a very large number of observations. In our baseline sample (e.g. in Table 4) we have around 700'000 observations. Given the large number of observations, we can expect most results to be highly statistically significant – in fact, we would be surprised to find a variable that is *not* statistically significant. Statistical significance is therefore not the best criteria for interpreting our results. Instead, it would be better to also consider 'economic significance' which is indicated by the magnitude of the coefficient.

Figure 1 shows the size and age distributions for the small businesses in our sample. The size distribution (Figure 1; left) shows a smooth unimodal shape, which is in line with the previous literature on firm size distributions. There is a concave decay on the upper tail, which indicates that the firm size distribution has a faster decay than the

[7]Firms are identified as declining firms if their net worth in 2001-2002 is less than 50% of their net worth in 2000-2001, if there has been a continuous delay in the payment of interest on the loans during the last year, or if there has been continuous decline in the output in the period 2000-2002.

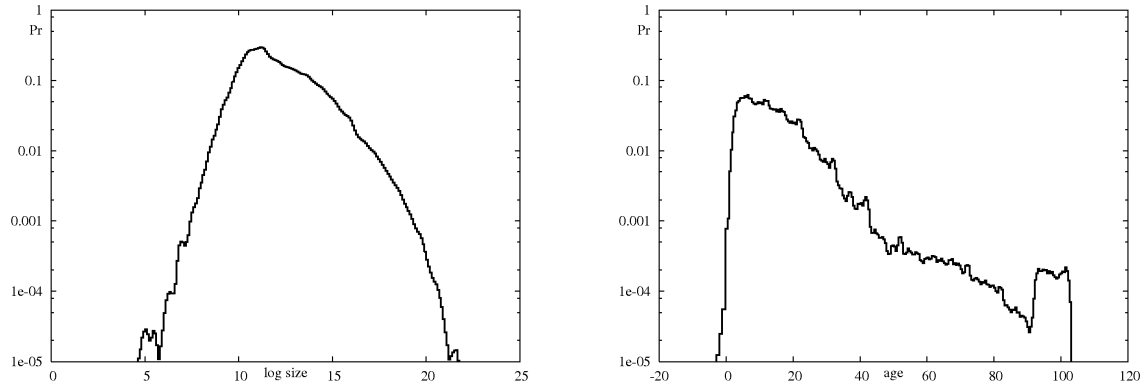

Figure 1: Kernel densities of the size distribution (log output in 2000; left) and age distribution (right), both plotted with a logarithmic y-axis. Kernel densities are computed for equispaced points using an Epanenchnikov kernel (using the gbutils 5.1 software package).

Pareto benchmark. Although there is an upper size threshold which determines whether or not firms are required to answer the questionnaire, this threshold does not produce any dramatic cut-off point at the upper end of the size distribution. The age distribution is shown in (Figure 1; left). To our knowledge, this is the first such representation of the age distribution of a sample of firms, presumably because data on age is not always easy to obtain. Most of the businesses are very young, the median age being 12 years and 75% of the businesses being 18 or younger. The decay in the distribution is roughly linear over most of the support, which allows us to speculate that an exponential law would be a suitable representation.[8] There is a local peak at around 100 years, however, which is relatively insignificant in magnitude although it is clearly discernable when logarithmic axes are being used. This local peak could be due to misreporting, as firms approximate their age to a century.[9] More work on this topic is clearly warranted.

[8]Incidentally, this lends some support to the assumption of an exponential distribution of firm age in the model of the firm size distribution in Coad (2009). In this model, the lognormal distribution of firm size obtained from a Gibrat process is mixed with an exponential firm age distribution to obtain the Pareto firm size distribution suggested by a number of empirical studies.

[9]Self-reported data on the age of small businesses has been described by Phillips and Kirchhoff (1989) as being less than perfectly reliable, even in developed countries such as the US. In the case of India, it should be remembered that many *people* don't know exactly how old they are! As such, there may well be a small degree of measurement error in the age distribution, and as a result we don't seek to explain every feature of this distribution, but at this preliminary stage we merely emphasize the broad shape of the distribution. For instance, the age distribution as represented in Figure 1 is powerful enough to quickly dispel the myth that all small firms are young.

2.4 Measurement error

It is likely that there are several sources of measurement error. Although great efforts have been undertaken to make this survey as accurate as possible, and this survey is considered to be an authoritative source of information that has been used to guide industrial policy in India, it cannot be expected that the records are 100% accurate. First, many of the micro firms that were questioned do not keep detailed accounts of their activities, and so their responses will not be entirely accurate. Second, in surveys of this scale it is not inconceivable that the field investigators do not go to each potential respondent. Instead, it may be that some questionnaire investigators 'invent' survey responses (e.g. in the case of the investigator who stays in his hotel room on a hot day and invents the responses of the businesses he/she is too lazy to visit). This scenario is not unlikely, considering that corruption is a part of life in the Indian government (Allen et al., 2006). Third, there may well be data entry problems. For example, if the data is mistakenly entered with an extra 'zero', or if a digit is accidentally omitted, then the firm will experience a tenfold growth rate (positive or negative growth). Looking at the growth rate distribution, we are in fact able to detect an unnaturally high occurrence of tenfold growth rates when the data are plotted on logarithmic axes (see Figure 2, right) although these local peaks are barely visible on standard axes (see Figure 2, left). We must conclude that misreporting, measurement error, and data entry mistakes are present in our dataset.

To take these caveats into account, we trim our dataset for outliers. In our main specification we omit firms experiencing +/- 400% growth, although we also explore the robustness of our results using a 200% growth cutoff point. Furthermore, we use median regressions which are more robust to outliers than least-squares estimators (such as OLS). While least-squares estimators minimize the sum of squared residuals, median regressions minimize the sum of absolute regressions (which is why median regressions are sometimes known as 'minimum absolute deviation' regressions). Median regressions have also been popular in growth rate regressions because of the heavy-tailed and non-Gaussian nature of growth rate distributions (see e.g. Bottazzi et al. (2008), Coad (2007)). However,

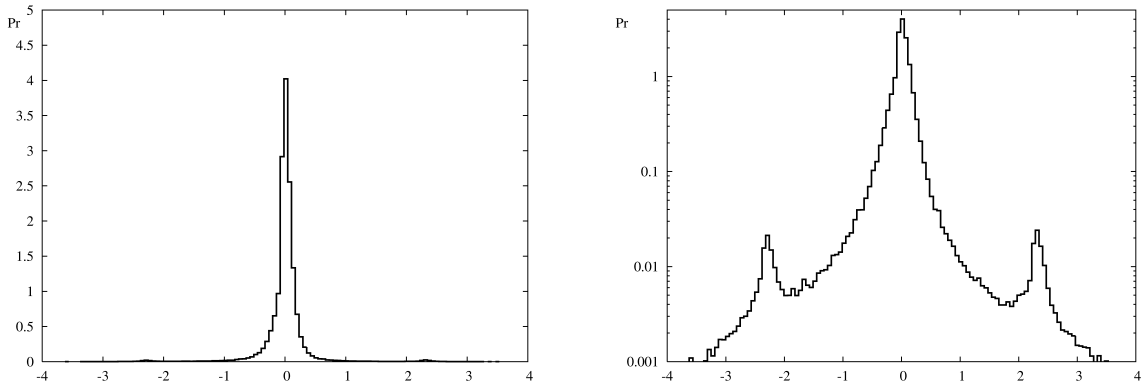

Figure 2: Annual growth rate distributions (i.e. (log) growth of output 2001-02) plotted on a linear y-axis (left) or a logarithmic y-axis (right). Note the local peaks in the right-hand figure at $\pm\log_e 10 = \pm 2.303$, which correspond to tenfold growth rates. Kernel densities are computed for equispaced points using an Epanenchnikov kernel (using the gbutils 5.1 software package).

in a robustness analysis we also investigate OLS estimates (not reported). Generally, these tend to be similar to median regression results, though. To reduce the influence of unreliable data, we also smooth our growth rate variable by measuring growth over a three-year period, not just one year, so that the impact of short-term growth shocks can be smoothed out.[10]

3 Empirical Results

3.1 Regression analysis

We estimate the following growth equation:

$$Growth_{it} = \alpha + \beta_1 * Size_{t-1} + \beta_2 * Age + \beta_3 * ProprietaryOwnership + \beta_4 * Woman + \beta_5 * PowerSource + \beta_6 * AbroadKnowledge + \beta_7 * Sector + \varepsilon$$

As seen in all specifications in Table 4, size has a small negative association with firm growth. Age, also, has a negative influence on firm growth. The negative dependence of growth on size is well documented in the literature and is taken by many authors as a 'stylized fact' (see Coad, 2009, for a survey). A negative dependence of growth on age has

[10] A similar approach can be found in e.g. (Liu et al. (1999).

also been found by a long list of authors.[11] In the case of India, however, two recent studies (Das, 1995; Shanmugam and Bhaduri, 2002) observe that while larger firms have lower growth rates, age is significantly positively related to firm growth. Das (1995) examines the growth of firms in a young, fast-growing computer hardware industry in India, while Shanmugam and Bhaduri (2002) focus on a sample of 392 Indian manufacturing firms. Our finding of a negative dependence of growth on age is thus able to reconcile the dynamics of Indian firms to the broad regularities observed in the rest of the world. The negative association between age and growth is not statistically significant in all of our results, however – it is sometimes absent in the case of firms that are older than 20 years, as evidenced in Column (6) of Table 6, Table 7 and Table 8. Age, it seems, has a retarding effect on growth for younger firms, but this retarding effect fades for firms above a certain age threshold. As such, our results are similar to those obtained by Bigsten and Gebreeyesus (2007), who analyze Ethiopian census data on manufacturing firms with over 10 employees. Bigsten and Gebreeyesus (2007) observe that "[g]rowth and age are inversely related only in the first few years after entry and stay constant for most of the age group until it starts to have a positive relation beyond age 50." (p. 831).

It is usually assumed that partnerships facilitate the process of building firms' resources. However, the results suggest that proprietary ownership enables faster growth. This result suggests that ownership structures such as partnerships are less conducive to growth.

Consistent with other studies, firms headed by females are found to grow slower. Mead and Liedholm (1998) survey the literature on female entrepreneurs in developing countries and conclude that female-led businesses have lower survival probabilities and lower expected growth rates (even after controlling for other relevant factors).

[11] A negative relationship between age and growth has been found by Fizaine (1968) for French establishments, Dunne et al. (1989) for US establishments, Evans (1987b,a) for US manufacturing firms, Variyam and Kraybill (1992) for US manufacturing and services firms, Liu et al. (1999) for Taiwanese electronics plants, Sleuwaegen and Goedhuys (2002) for Ivorian manufacturing firms, Reichstein and Dahl (2004) for Danish limited liability companies, Geroski and Gugler (2004) for large European companies, Dollar et al. (2005) for Bangladesh, China, India and Pakistan and Yasuda (2005) for Japanese manufacturing firms.

Technical knowhow from abroad has a positive influence on firm growth, in particular for firms that are less than 10 years old. Exporting has a positive influence on growth in all specifications.

In Table 5 we restrict the analysis to firms that are owned by proprietors. The results mirror the above findings. Size and age have negative effects on firm growth and women enterprises grow slower. Technical knowhow from abroad has a positive impact on growth for firms that are either very young or very old. Exporting also has a positive influence in nearly all specifications (though not for small scale industries over 20 years old).

In Table 6 we restrict the analysis to firms managed by women. The results suggest that female run businesses that use external knowhow do not grow faster than other firms. This anomalous result could be because of cultural factors leading to lower levels of education among women. It could also be because female-run businesses are not run from the angle of innovation and profit lust, but merely from a logic of survival and as an independent source of revenue. In this context, adapting to new technologies may be very difficult to succeed. However, it is seen that for firms owned by women that are less than 10 years old, technical knowhow from abroad has a positive impact on growth suggesting that the above traditional view is not set in stone.

Firms without any energy requirements are examined in Table 7. A striking result that emerges from this estimation is that proprietary ownership has a negative impact on firm growth for firms without any power source, particularly in the first three specifications. Interestingly enough, for such firms aged over 20 years, age and exporting intensity appear to be unrelated to sales growth.

Knowhow has no beneficial effect for firms declaring firewood as their main source of energy (Table 8). It could be anticipated that firms such as these are too far from the world technology frontier and lack the 'absorptive capacity' required to be able to successfully internalize new technological knowledge from abroad. Proprietary ownership has an insignificant effect on growth once the industry effects are controlled and has a positive effect at 10% significance level, only for firms older than 20 years.

Our results also suggest that in several cases, exporting has no influence on firm growth for firms aged over 20 years (Table 5, Table 7, Table 8) while there is a positive effect for younger firms. This is consistent with learning theories of firm growth via internationalization, which consider that entrepreneurial dynamism and vision are more important factors affecting export success than age and experience. In this view, older firms suffer from cognitive inertia that makes them less responsive to business opportunities and changing market conditions (Autio et al., 2000).

3.2 Barriers to growth

Our questionnaire contains questions that relate specifically to declining firms and the specific obstacles to growth faced by these firms. In a first stage, firms are identified as declining firms if their net worth in 2001-2002 is less than 50% of their net worth in 2000-2001, if there has been a continuous delay in the payment of interest on the loans during the last year, or if there has been continuous decline in the output in the period 2000-2002. In a second stage, these declining firms are given a list of eight reasons for their poor performance, and asked to identify which are the most important factors. These eight factors are the following: lack of demand, shortage of working capital, non availability of raw materials, power shortage, labour problems, marketing problems, equipment problems, and management problems.

In Table 9 we used probit regresions to examine the determinants of a firm being classified as a 'declining firm'. The dependent variable is binary and takes a value of 1 for 'declining firms' and 0 otherwise.

Columns 2-4 suggest that size is inversely related to firm decline. This result is consistent with the finding of most empirical studies that firm survival is positively related to size. However for firms older than 10 years the size is positively related to decline at 1% significance level.[12] In contrast to the existing studies, age is found to have a significant

[12]Our results appear to be somewhat consistent with the concepts of a 'liability of newness' that plagues young firms, as well as a 'liability of obsolescence' that affects older firms (Hannan (2005)).

positive effect on firm decline. For firms older than 20 years, however, neither size nor age have a significant effect in our sample.

In all the specifications in Table 9, proprietary owners are less likely and women enterprises more likely to decline. Firms that have any source of energy including those that do not use any power are less likely to decline relative to those that use firewood as the main source of power. Firms that have technical knowhow from abroad are also less likely to decline (except those that are older than 20 years). Finally, our estimates suggest that exporting firms are more likely to decline. This provides an interesting contrast with the results from the growth equations in the previous subsection, it shows that small firms with export orientation have a higher volatility – they either grow fast or face decline.[13]

In Table 10 we apply probit estimates to examine the internal determinants of (subjectively perceived) barriers to growth and survival that these firms face. Our approach is similar to Sleuwaegen and Goedhuys (2002) for Ivorian firms and Robson and Obeng (2008) who analyze Ghanaian firms. As results in columns 4 and 5 show, an increase in the size makes a firm cite power shortage and labor problems as the main reasons for decline. While proprietary entrepreneurs hold shortage of working capital and power responsible for decline, for women entrepreneurs market problems and availability of raw materials are barriers for growth. Firms that have technical knowhow from abroad, and firms that are experiencing decline, perceive lack of adequate working capital as the main reason for their decline. For exporting firms that have declined, labor problems and equipment problems are the most significant causes for contraction.

[13]We pursue this result by investigating the differential effects of exporting on firm growth at different quantiles of the growth rate distribution, using quantile regressions. The results support the view that exporting makes a positive contribution to growth for rapidly growing firms although it has an negative effect on the growth of declining firms. The results are available from the authors upon request.

4 Conclusion

Developing countries have their own specific requirements for their micro and small enterprise (MSE) sectors, and the corresponding MSE strategies may well be different from their counterparts in developed countries. However, in order to construct a meaningful industrial policy for the MSE sector in developing countries, reliable empirical estimates of key indicators of industrial dynamics are badly needed. Unfortunately, though, empirical work on MSEs has focused on developed countries. The little work that exists on developing countries is all too often based on small samples taken from ad hoc questionnaires.

The aim of this paper is to complement the sparse literature that exists on the nature and performance of small businesses in developing countries. Our results are fairly representative of the structure of small business in India, and our results may also possibly be useful in understanding what happens in other developing countries.

If our small firms are technological leaders, we can expect technical knowhow to have a positive influence on output growth. Although many small firms are able to convert knowhow into commercial success, many others do not have any technical knowledge and some are unable to use it. Indeed, many small firms in our sample of Indian enterprises are not cutting-edge innovators - as evidenced by a number of firms whose main source of energy is firewood.

Consistent with prior research on developed countries, size and age have a negative impact on firm growth in the majority of specifications. The decision to export seems to be a double-edged sword – if successful it can accelerate the growth of successful firms, but it can also increase the probability of decline. While proprietary ownership results in faster growth, a result is consistent across many specifications, enterprises managed by women are less likely to grow and more likely to decline.

References

Acs, Z. J. and Audretsch, D. B. (1990). *Innovation and Small Firms*. MIT Press.

Aghion, P., Burgess, R., Redding, S., and Zilibotti, F. (2005). Entry liberalization and inequality in industrial performance. *Journal of the European Economic Association*, 3(2-3):291–302.

Allen, F., Chakrabarti, R., De, S., Qian, J., and Qian, M. (2006). Financing firms in India. World Bank Policy Research Working Paper 3975.

Audretsch, D. and Tamvada, J. P. (2008). The distribution of firm start-up size across geographic space. CEPR Discussion Paper 6846.

Autio, E. (2008). High- and low-aspiration entrepreneurship and economic growth in low-income economies. Paper presented at the UNU-WIDER project workshop on Entrepreneurship and Economic Development, Helsinki.

Autio, E., Sapienza, H., and Almeida, J. (2000). Effects of age at entry, knowledge intensity, and imitability on international growth. *Academy of Management Journal*, 43(5):909–924.

Balakrishnan, P., Parameswaran, M., Pushpangadan, K., and Babu, M. (2006). Liberalization, market power, and productivity growth in Indian industry. *Journal of Policy Reform*, 9(1):55–73.

Beck, T., Demirguc-Kunt, A., and Levine, R. (2005). SMEs, growth, and poverty: Cross-country evidence. *Journal of Economic Growth*, 10(3):199–229.

Bigsten, A. and Gebreeyesus, M. (2007). The small, the young, and the productive: Determinants of manufacturing firm growth in Ethiopia. *Economic Development and Cultural Change*, 55(4):813–840.

Bottazzi, G., Coad, A., Jacoby, N., and Secchi, A. (2008). Corporate growth and industrial dynamics: Evidence from French manufacturing. *Applied Economics*, Forthcoming.

Coad, A. (2007). A closer look at serial growth rate correlation. *Review of Industrial Organization*, 31(1):69–82.

Coad, A. (2009). *The Growth of Firms: A Survey of Theories and Empirical Evidence*. Edward Elgar: Cheltenham, UK. forthcoming.

Das, S. (1995). Size, age and firm growth in an infant industry: The computer hardware industry in India. *International Journal of Industrial Organization*, 13(1):111–126.

Dollar, D., Hallward-Driemeier, M., and Mengistae, T. (2005). Investment Climate and Firm Performance in Developing Economies. *Economic Development and Cultural Change*, 54(1):1–31.

Dunne, T., Roberts, M., and Samuelson, L. (1989). The growth and failure of US manufacturing plants. *Quarterly Journal of Economics*, 104(4):671–698.

El-Namaki, M. S. S. (1988). Encouraging entrepreneurs in developing countries. *Long Range Planning*, 21(4):98–106.

Evans, D. S. (1987a). The relationship between firm growth, size and age: Estimates for 100 manufacturing industries. *Journal of Industrial Economics*, 35:567–581.

Evans, D. S. (1987b). Tests of alternative theories of firm growth. *Journal of Political Economy*, 95(4):657–674.

Fizaine, F. (1968). Analyse statistique de la croissance des entreprises selon l'age et la taille. *Revue d'économie politique*, 78:606–620.

Geroski, P. A. (1995). What do we know about entry? *International Journal of Industrial Organization*, 13:421–440.

Geroski, P. A. and Gugler, K. (2004). Corporate growth convergence in Europe. *Oxford Economic Papers*, 56:597–620.

Hannan, M. T. (2005). Ecologies of organizations: Diversity and identity. *Journal of Economic Perspectives*, 19(1):51–70.

Hay, M. and Kamshad, K. (1994). Small firm growth: Intentions, implementation and impediments. *Business Strategy Review*, 5(3):49–68.

Hisrich, R. D. and Ozturk, S. A. (1999). Women entrepreneurs in a developing economy. *Journal of Management Development*, 18(2):114–124.

Kochhar, K., Kumar, U., Rajan, R., Subramanian, A., and Tokatlidis, I. (2006). India's pattern of development: What happened, what follows? *Journal of Monetary Economics*, 53(5):981–1019.

Kozan, M., Oksoy, D., and Ozsoy, O. (2006). Growth plans of small businesses in Turkey: Individual and environmental influences. *Journal of Small Business Management*, 44(1):114–129.

Krishna, P. and Mitra, D. (1998). Trade liberalization, market discipline and productivity growth: New evidence from India. *Journal of Development Economics*, 56(2):447–462.

Leff, N. H. (1979). Entrepreneurship and economic development: The problem revisited. *Journal of Economic Literature*, 17:46–64.

Little, I. M. D. (1987). Small manufacturing enterprises in developing countries. *World Bank Economic Review*, 1(2):203–235.

Liu, J., Tsou, M., and Hammitt, J. (1999). Do small plants grow faster? evidence from the Taiwan electronics industry. *Economics Letters*, 65(1):121–129.

McPherson, M. A. (1996). Growth of micro and small enterprises in Southern Africa. *Journal of Development Economics*, 48:253–277.

Mead, D. C. and Liedholm, C. (1998). The dynamics of micro and small enterprises in developing countries. *World Development*, 26:61–74.

Nafziger, E. and Terrell, D. (1996). Entrepreneurial human capital and the long-run survival of firms in India. *World Development*, 24(4):689–696.

Pavitt, K., Robson, M., and Townsend, J. (1987). The size distribution of innovating firms in the UK: 1945-1983. *Journal of Industrial Economics*, 35(3):297–316.

Phillips, B. and Kirchhoff, B. (1989). Formation, growth and survival; small firm dynamics in the US economy. *Small Business Economics*, 1(1):65–74.

Reichstein, T. and Dahl, M. (2004). Are firm growth rates random? analysing patterns and dependencies. *International Review of Applied Economics*, 18(2):225–246.

Robson, P. and Obeng, B. (2008). The barriers to growth in Ghana. *Small Business Economics*, 30(4):385–403.

Rodrik, D. and Subramanian, A. (2005). From 'Hindu growth' to productivity surge: The mystery of the Indian growth transition. *IMF Staff Papers*, 52(2).

Rogerson, C. (1996). Urban poverty and the informal economy in South Africa's economic heartland. *Environment and Urbanization*, 8(1):167.

Santarelli, E. and Vivarelli, M. (2007). Entrepreneurship and the process of firms' entry, survival and growth. *Industrial and Corporate Change*, 16(3):455–488.

Shanmugam, K. and Bhaduri, S. (2002). Size, age and firm growth in the Indian manufacturing sector. *Applied Economics Letters*, 9(9):607–613.

Singh, S. P., Reynolds, R. G., and Muhammad, S. (2001). A gender-based performance analysis of micro and small enterprises in Java, Indonesia. *Journal of Small Business Management*, 39(2):174–182.

Sleuwaegen, L. and Goedhuys, M. (2002). Growth of firms in developing countries, evidence from Côte d'Ivoire. *Journal of Development Economics*, 68(1):117–135.

Tybout, J. R. (2000). Manufacturing firms in developing countries: How well do they do, and why? *Journal of Economic Literature*, 38:11–44.

Van Biesebroeck, J. (2005). Firm size matters: Growth and productivity growth in African manufacturing. *Economic Development and Cultural Change*, 53(3):545–583.

Variyam, J. N. and Kraybill, D. S. (1992). Empirical evidence on determinants of firm growth. *Economics Letters*, 38:31–36.

Yasuda, T. (2005). Firm growth, size, age and behavior in Japanese manufacturing. *Small Business Economics*, 24(1):1–15.

You, J.-I. (1995). Small firms in economic theory. *Cambridge Journal of Economics*, 19:441–462.

Table 1: Development and poverty indicators for India

		Year	India	World
Population	Millions	2004	1079.7	6345.1
	Avg. Annual % growth	2000-2004	1.5	1.2
	Density people per km^2	2004	363	49
Gross National Income (GNI)	Billions of dollars	2004	3347	55584
	Per capita dollars	2004	3100	8760
Gross Domestic product	per capita % growth	2003-2004	5.4	2.9
Life expectancy at birth	(male; female)	2003	63; 64	65; 69
Adult literacy rate	% of people 15 and above	1998-2004	61	82
Population below $1 a day	%	1999-2000	35.3	-
Population below $2 a day	%	1999-2000	80.6	-
Percentage share of income or consumption	Lowest 20%	1999-00	8.9	-
	Highest 20%	1999-00	41.6	-
Value added as % of GDP	Agricultural	2004	22	-
	Industry	2004	26	-
	Services	2004	52	-

Sources: Allen et al. (2006), World bank.

Table 2: Descriptive Statistics-All Firms

	Mean	S.D	Min	Max
Firm Characteristics				
Growth 2000-2002	0.136	0.29	-1.39	1.39
Growth 2001-2000	0.076	0.20	-1.39	1.39
Growth 2002-2001	0.060	0.20	-1.39	1.38
Ln(Output 2002)	12.134	1.78	0.69	22.78
Ln(Output 2001)	12.074	1.77	0.69	22.84
Ln(Output 2000)	11.998	1.78	0.69	22.74
Age	13.888	10.23	0	102
Ownership Type				
Proprietary Ownership	0.862	0.35	0	1
Partnership	0.094	0.29	0	1
Private Company	0.031	0.17	0	1
Co-operative	0.004	0.06	0	1
Other Ownership	0.010	0.10	0	1
Woman	0.082	0.27	0	1
Power Source				
No Power	0.195	0.40	0	1
Coal	0.024	0.15	0	1
Oil	0.036	0.19	0	1
LPG	0.006	0.08	0	1
Electricty	0.706	0.46	0	1
Non Conventional Energy	0.004	0.07	0	1
Firewood	0.028	0.17	0	1
Knowledge Base				
Knowhow from Abroad	0.010	0.10	0	1
Export	0.007	0.09	0	1
N	695757			

Table 3: Descriptive Statistics-Declining Firms

	Mean	S.D	Min	Max
Firm Characteristics				
Growth 2000-2002	-0.250	0.34	-1.39	1.38
Growth 2001-2000	-0.104	0.20	-1.37	1.37
Growth 2002-2001	-0.145	0.23	-1.38	1.38
Ln(Output 2002)	11.985	1.94	5.01	21.56
Ln(Output 2001)	12.131	1.93	5.30	21.59
Ln(Output 2000)	12.235	1.92	5.42	21.64
Age	14.152	10.28	0	102
Ownership Type				
Proprietary Ownership	0.837	0.37	0	1
Partnership	0.111	0.31	0	1
Private Company	0.037	0.19	0	1
Co-operative	0.006	0.08	0	1
Other Ownership	0.009	0.09	0	1
Woman	0.115	0.32	0	1
Power Source				
No Power	0.186	0.39	0	1
Coal	0.019	0.14	0	1
Oil	0.021	0.14	0	1
LPG	0.007	0.08	0	1
Electricty	0.726	0.45	0	1
Non Conventional Energy	0.004	0.06	0	1
Firewood	0.037	0.19	0	1
Knowledge Base				
Knowhow from Abroad	0.009	0.10	0	1
Export	0.010	0.10	0	1
N	96752			

Table 4: Determinants of Firm Growth. Regression results - 4qreg1. Full sample. Dependent variable: growth rate over three annual exercises (from 1999-2000 till 2001-2002). Firms experiencing more than fourfold growth are excluded. Column (4) reports results for firms with age 10 years or less. Column (5) reports results for firms with age greater than 10 years. Column (6) reports results for firms with age greater than 20 years.

	(1) Growth 1999-2002	(2) Growth 1999-2002	(3) Growth 1999-2002	(4) Growth 1999-2002	(5) Growth 1999-2002	(6) Growth 1999-2002
Ln(Output)	-0.0123***	-0.0160***	-0.0175***	-0.0182***	-0.0174***	-0.0161***
	(0.000133)	(0.000162)	(0.000177)	(0.000282)	(0.000222)	(0.000335)
Age	-0.000550***	-0.000601***	-0.000747***	-0.00465***	-0.000226***	-0.000104***
	(2.32e-05)	(2.33e-05)	(2.44e-05)	(0.000161)	(3.07e-05)	(3.94e-05)
Ownership						
Proprietary		-0.00700***	-0.00362***	-0.00664***	-0.00148	0.000432
		(0.000757)	(0.000773)	(0.00123)	(0.000972)	(0.00143)
Woman		-0.0217***	-0.00425***	-0.00567***	-0.00452***	-0.00705***
		(0.000868)	(0.000913)	(0.00131)	(0.00127)	(0.00214)
Knowledge Source						
Abroad		0.00480**	-0.00355	0.00411	-0.00921***	-0.00104
		(0.00234)	(0.00238)	(0.00381)	(0.00297)	(0.00485)
Domestic		-0.00653***	-0.00110	0.00123	-0.00175*	-0.00505***
		(0.000683)	(0.000707)	(0.00111)	(0.000893)	(0.00139)
Power Source						
Coal		-0.00347**	-0.00131	0.00193	-0.00263	-0.00595**
		(0.00162)	(0.00172)	(0.00328)	(0.00196)	(0.00268)
Oil		0.0105***	0.00767***	0.00545**	0.00911***	0.00126
		(0.00137)	(0.00152)	(0.00235)	(0.00197)	(0.00353)
LPG		0.00204	0.0257***	0.0197***	0.0274***	0.0209***
		(0.00310)	(0.00317)	(0.00471)	(0.00421)	(0.00657)
Electricity		0.0164***	0.0188***	0.0218***	0.0158***	0.0151***
		(0.000652)	(0.000757)	(0.00117)	(0.000974)	(0.00157)
Non Conventional		0.0301***	0.0293***	0.0353***	0.0233***	0.0193**
		(0.00357)	(0.00363)	(0.00556)	(0.00469)	(0.00801)
Firewood		-0.0225***	0.00306*	0.0101***	-0.000283	-0.000668
		(0.00151)	(0.00159)	(0.00255)	(0.00199)	(0.00304)
Firm Characteristics						
Rural		-0.0162***	-0.00473***	-0.00903***	-0.00224***	-0.000849
		(0.000510)	(0.000548)	(0.000852)	(0.000701)	(0.00114)
Export		0.0525***	0.0627***	0.0870***	0.0535***	0.0493***
		(0.00280)	(0.00285)	(0.00464)	(0.00351)	(0.00501)
Industry Effects	No	No	Yes	Yes	Yes	Yes
Region Effects	No	No	Yes	Yes	Yes	Yes
Constant	0.297***	0.346***	0.347***	0.394***	0.330***	0.307***
	(0.00163)	(0.00230)	(0.00276)	(0.00460)	(0.00344)	(0.00543)
Observations	695757	695757	695757	304022	391735	132534

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Regression results - 4qreg2. Sample restricted to Proprietary Owner Firms. Dependent variable: growth rate over three annual exercises (from 1999-2000 till 2001-2002). Firms experiencing more than fourfold growth are excluded. Column (4) reports results for firms with age 10 years or less. Column (5) reports results for firms with age greater than 10 years. Column (6) reports results for firms with age greater than 20 years.

	(1) Growth 1999-2002	(2) Growth 1999-2002	(3) Growth 1999-2002	(4) Growth 1999-2002	(5) Growth 1999-2002	(6) Growth 1999-2002
Ln(Output)	-0.0125***	-0.0163***	-0.0199***	-0.0211***	-0.0193***	-0.0177***
	(0.000187)	(0.000195)	(0.000198)	(0.000316)	(0.000271)	(0.000422)
Age	-0.000471***	-0.000534***	-0.000728***	-0.00455***	-0.000226***	-8.16e-05*
	(2.86e-05)	(2.68e-05)	(2.59e-05)	(0.000167)	(3.53e-05)	(4.63e-05)
Ownership						
Woman		-0.0220***	-0.00440***	-0.00651***	-0.00389***	-0.00583**
		(0.000976)	(0.000949)	(0.00135)	(0.00144)	(0.00256)
Knowledge Source						
Abroad		0.0135***	0.00364	0.0120***	-0.00246	0.0111*
		(0.00290)	(0.00272)	(0.00436)	(0.00367)	(0.00632)
Domestic		-0.00548***	0.00112	0.00212*	0.00104	-0.00304*
		(0.000797)	(0.000759)	(0.00120)	(0.00104)	(0.00168)
Power Source						
Coal		-0.00376**	-0.000906	0.00380	-0.00271	-0.00617**
		(0.00177)	(0.00174)	(0.00333)	(0.00215)	(0.00303)
Oil		0.0107***	0.00897***	0.00815***	0.0105***	0.00268
		(0.00148)	(0.00153)	(0.00235)	(0.00214)	(0.00400)
LPG		-0.00343	0.0231***	0.0176***	0.0256***	0.0191**
		(0.00351)	(0.00330)	(0.00486)	(0.00481)	(0.00784)
Electricity		0.0159***	0.0191***	0.0227***	0.0160***	0.0143***
		(0.000707)	(0.000761)	(0.00117)	(0.00107)	(0.00177)
Non Conventional		0.0297***	0.0311***	0.0367***	0.0265***	0.0213**
		(0.00401)	(0.00375)	(0.00577)	(0.00523)	(0.00934)
Firewood		-0.0227***	0.00485***	0.0125***	0.00166	0.00169
		(0.00164)	(0.00160)	(0.00255)	(0.00217)	(0.00342)
Firm Characteristics						
Rural		-0.0188***	-0.00719***	-0.0116***	-0.00431***	-0.00243*
		(0.000576)	(0.000568)	(0.000891)	(0.000785)	(0.00131)
Export		0.0400***	0.0499***	0.0682***	0.0408***	0.0388***
		(0.00426)	(0.00399)	(0.00661)	(0.00527)	(0.00798)
Industry Effects	No	No	Yes	Yes	Yes	Yes
Region Effects	No	No	Yes	Yes	Yes	Yes
Constant	0.298***	0.343***	0.369***	0.416***	0.350***	0.324***
	(0.00223)	(0.00231)	(0.00268)	(0.00452)	(0.00362)	(0.00594)
Observations	599395	599395	599395	261967	337428	111095

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Regression results - 4qreg3. Female enterprises only. Dependent variable: growth rate over three annual exercises (from 1999-2000 till 2001-2002). Firms experiencing more than fourfold growth are excluded. Column (4) reports results for firms with age 10 years or less. Column (5) reports results for firms with age greater than 10 years. Column (6) reports results for firms with age greater than 20 years.

	(1) Growth 1999-2002	(2) Growth 1999-2002	(3) Growth 1999-2002	(4) Growth 1999-2002	(5) Growth 1999-2002	(6) Growth 1999-2002
Ln(Output)	-0.0149***	-0.0197***	-0.0206***	-0.0206***	-0.0212***	-0.0214***
	(0.000545)	(0.000615)	(0.000656)	(0.00108)	(0.000889)	(0.00192)
Age	-0.000325***	-0.000357***	-0.00104***	-0.00558***	-0.000381***	-0.000139
	(0.000107)	(9.92e-05)	(0.000102)	(0.000610)	(0.000130)	(0.000235)
Ownership						
Proprietary		-0.0169***	-0.0161***	-0.0185***	-0.0123***	-0.00418
		(0.00296)	(0.00296)	(0.00485)	(0.00397)	(0.00824)
Knowledge Source						
Abroad		0.00275	-0.0142*	0.0150	-0.0303***	-0.0607**
		(0.00846)	(0.00843)	(0.0150)	(0.0105)	(0.0250)
Domestic		0.00626**	0.00588**	0.00904**	0.00294	-8.83e-05
		(0.00251)	(0.00254)	(0.00412)	(0.00345)	(0.00781)
Power Source						
Coal		-0.00194	-0.0176**	0.00545	-0.0184*	0.00856
		(0.00851)	(0.00863)	(0.0165)	(0.0103)	(0.0213)
Oil		0.00954	-0.0119*	-0.0155	-0.00623	-0.00970
		(0.00658)	(0.00689)	(0.0114)	(0.00920)	(0.0229)
LPG		-0.0104	0.0303***	0.0409***	0.0136	0.00173
		(0.00991)	(0.01000)	(0.0147)	(0.0158)	(0.0353)
Electricity		0.00316	0.0141***	0.0145***	0.0152***	0.0317***
		(0.00222)	(0.00252)	(0.00384)	(0.00374)	(0.00942)
Non Conventional		0.0250**	0.0138	0.0394**	-0.0328**	-0.0120
		(0.0111)	(0.0110)	(0.0166)	(0.0166)	(0.0388)
Firewood		-0.0230***	0.00952*	0.00946	0.0118*	-0.00429
		(0.00476)	(0.00498)	(0.00793)	(0.00701)	(0.0163)
Firm Characteristics						
Rural		-0.0244***	-0.00275	-0.00432	-0.000368	-0.000628
		(0.00194)	(0.00203)	(0.00320)	(0.00289)	(0.00715)
Export		0.0739***	0.0641***	0.113***	0.0605***	0.0920***
		(0.00996)	(0.00988)	(0.0181)	(0.0120)	(0.0253)
Industry Effects	No	No	Yes	Yes	Yes	Yes
Region Effects	No	No	Yes	Yes	Yes	Yes
Constant	0.303***	0.382***	0.385***	0.429***	0.368***	0.330***
	(0.00639)	(0.00841)	(0.0103)	(0.0178)	(0.0137)	(0.0309)
Observations	57182	57182	57182	32286	24896	7005

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Regression results - 4qreg4. Firms declaring 'power source – no power needed.' Dependent variable: growth rate over three annual exercises (from 1999-2000 till 2001-2002). Firms experiencing more than fourfold growth are excluded. Column (4) reports results for firms with age 10 years or less. Column (5) reports results for firms with age greater than 10 years. Column (6) reports results for firms with age greater than 20 years.

	(1) Growth 1999-2002	(2) Growth 1999-2002	(3) Growth 1999-2002	(4) Growth 1999-2002	(5) Growth 1999-2002	(6) Growth 1999-2002
Ln(Output)	-0.0309***	-0.0351***	-0.0323***	-0.0347***	-0.0312***	-0.0274***
	(0.000367)	(0.000470)	(0.000529)	(0.000805)	(0.000619)	(0.000996)
Age	-0.000164***	-0.000266***	-0.000452***	-0.00360***	-0.000129**	-9.20e-05
	(4.30e-05)	(5.22e-05)	(5.68e-05)	(0.000338)	(6.38e-05)	(8.29e-05)
Ownership						
Proprietary		-0.0203***	-0.0257***	-0.0378***	-0.0196***	-0.0127**
		(0.00277)	(0.00290)	(0.00437)	(0.00340)	(0.00535)
Woman		-0.0169***	0.000189	-0.00459**	0.00324	-0.00482
		(0.00152)	(0.00173)	(0.00233)	(0.00230)	(0.00465)
Knowledge Source						
Abroad		0.0466***	0.0360***	0.0352***	0.0355***	0.0443***
		(0.00635)	(0.00661)	(0.0105)	(0.00747)	(0.0132)
Domestic		0.0130***	0.0188***	0.0213***	0.0180***	0.0177***
		(0.00167)	(0.00177)	(0.00266)	(0.00209)	(0.00359)
Firm Characteristics						
Rural		-0.0186***	-0.00646***	-0.0105***	-0.00453***	-0.00130
		(0.00109)	(0.00120)	(0.00183)	(0.00140)	(0.00241)
Export		0.0538***	0.0440***	0.0446**	0.0471***	0.0222
		(0.0108)	(0.0112)	(0.0184)	(0.0124)	(0.0190)
Industry Effects	No	No	Yes	Yes	Yes	Yes
Region Effects	No	No	Yes	Yes	Yes	Yes
Constant	0.482***	0.560***	0.535***	0.591***	0.510***	0.466***
	(0.00401)	(0.00638)	(0.00831)	(0.0131)	(0.00973)	(0.0166)
Observations	135653	135653	135653	61643	74010	22102

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Regression results - 4qreg5. Firms declaring 'power source – traditional energy/firewood.' Dependent variable: growth rate over three annual exercises (from 1999-2000 till 2001-2002). Firms experiencing more than fourfold growth are excluded. Column (4) reports results for firms with age 10 years or less. Column (5) reports results for firms with age greater than 10 years. Column (6) reports results for firms with age greater than 20 years.

	(1) Growth 1999-2002	(2) Growth 1999-2002	(3) Growth 1999-2002	(4) Growth 1999-2002	(5) Growth 1999-2002	(6) Growth 1999-2002
Ln(Output)	-0.0250***	-0.0279***	-0.0234***	-0.0270***	-0.0217***	-0.0176***
	(0.000902)	(0.00101)	(0.00101)	(0.00190)	(0.00124)	(0.00202)
Age	-0.000240*	-0.000371**	-0.000691***	-0.00315***	-0.000280*	-1.63e-05
	(0.000136)	(0.000145)	(0.000130)	(0.00103)	(0.000162)	(0.000239)
Ownership						
Proprietary		-0.0254***	-0.0163***	-0.0164*	-0.0116*	0.0124
		(0.00600)	(0.00522)	(0.00995)	(0.00628)	(0.00998)
Woman		-0.0143***	0.00453	-0.00170	0.00900*	-0.0118
		(0.00453)	(0.00402)	(0.00676)	(0.00545)	(0.00973)
Knowledge Source						
Abroad		-0.0205	-0.0373**	-0.0417	-0.0335*	0.0114
		(0.0201)	(0.0174)	(0.0386)	(0.0190)	(0.0343)
Domestic		-0.00250	-0.00401	-0.0148**	0.000962	0.00962
		(0.00423)	(0.00373)	(0.00703)	(0.00454)	(0.00769)
Firm Characteristics						
Rural		-0.0180***	-0.00281	-0.0119**	0.00239	0.00779
		(0.00308)	(0.00280)	(0.00539)	(0.00337)	(0.00556)
Export		0.153***	0.145***	0.140***	0.142***	0.112***
		(0.0177)	(0.0155)	(0.0299)	(0.0184)	(0.0295)
Industry Effects	No	No	Yes	Yes	Yes	Yes
Region Effects	No	No	Yes	Yes	Yes	Yes
Constant	0.403***	0.475***	0.442***	0.537***	0.403***	0.327***
	(0.0105)	(0.0147)	(0.0165)	(0.0328)	(0.0199)	(0.0351)
Observations	19769	19769	19769	8200	11569	4268

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Determinants of Firm Decline. Probit Regression results. Dependent variable is binary-1 if firm declined and 0 Otherwise. Firms are considered to be declining if their net worth in 2001-2002 is less than 50% of their net worth in 2000-2001 or if there has been a continuous delay in the payment of interest on the loans during the last year or if there has been continuous decline in the output in the period 2000-2002. Column (4) reports results for firms with age 10 years or less. Column (5) reports results for firms with age greater than 10 years. Column (6) reports results for firms with age greater than 20 years.

	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Output)	0.0450***	0.0520***	0.0555***	0.0535***	0.0565***	0.0494***
	(0.0010)	(0.0013)	(0.0014)	(0.0022)	(0.0018)	(0.0030)
Age	0.00119***	0.00228***	0.00455***	0.0213***	0.00295***	0.000875**
	(0.00018)	(0.00018)	(0.00020)	(0.0013)	(0.00026)	(0.00038)
Ownership						
Proprietary		-0.0158***	-0.0354***	-0.0292***	-0.0424***	-0.0614***
		(0.0059)	(0.0061)	(0.0094)	(0.0081)	(0.013)
Woman		0.255***	0.0852***	0.0945***	0.0785***	0.104***
		(0.0064)	(0.0070)	(0.0095)	(0.010)	(0.018)
Knowledge Source						
Abroad		-0.0851***	0.0321	-0.0304	0.0865***	0.0477
		(0.019)	(0.020)	(0.031)	(0.026)	(0.045)
Domestic		0.0984***	0.0712***	0.0604***	0.0772***	0.0450***
		(0.0052)	(0.0055)	(0.0084)	(0.0073)	(0.012)
Power Source						
Coal		-0.163***	0.0313**	0.0107	0.0490***	0.0514*
		(0.011)	(0.012)	(0.019)	(0.017)	(0.027)
Oil		-0.296***	-0.0503***	-0.0624*	-0.0267	-0.0251
		(0.017)	(0.018)	(0.032)	(0.022)	(0.033)
LPG		-0.449***	0.0763***	0.0308	0.110***	0.169***
		(0.016)	(0.017)	(0.026)	(0.023)	(0.040)
Electricity		-0.0945***	0.00199	-0.0276	0.0349	-0.00498
		(0.026)	(0.027)	(0.039)	(0.038)	(0.064)
Non Conventional		-0.157***	-0.00681	-0.0115	-0.00159	0.00532
		(0.011)	(0.012)	(0.018)	(0.015)	(0.025)
Firewood		-0.228***	-0.0342	-0.0717	-0.00688	-0.0182
		(0.031)	(0.032)	(0.048)	(0.043)	(0.078)
Firm Characteristics						
Rural		0.140***	0.0243***	0.0573***	-0.00229	-0.0458***
		(0.0040)	(0.0045)	(0.0067)	(0.0061)	(0.011)
Export		0.0453**	0.0283	-0.0176	0.0537**	0.0548
		(0.021)	(0.021)	(0.034)	(0.027)	(0.041)
Industry Effects	No	No	Yes	Yes	Yes	Yes
Region Effects	No	No	Yes	Yes	Yes	Yes
Constant	-1.644***	-1.664***	-1.756***	-1.861***	-1.721***	-1.499***
	(0.013)	(0.021)	(0.024)	(0.039)	(0.032)	(0.054)
Observations	695757	695757	695757	304022	391735	132531

Table 10: Barriers to growth – probit regressions. Dependent variable is a binary variable, taking the value 1 if the suggested factor is identified as a growth barrier and 0 otherwise. The sample is restricted to declining firms. Firms are considered to be declining if their net worth in 2001-2002 is less than 50% of their net worth in 2000-2001 or if there has been a continuous delay in the payment of interest on the loans during the last year or if there has been continuous decline in the output in the period 2000-2002.

Barrier	(1) Lack of Demand	(2) Working Capital	(3) Raw Material	(4) Power Shortage	(5) Labor problems	(6) Market Problems	(7) Equipment Problems	(8) Management Problems
Ln(Output)	-0.0443***	-0.0191***	0.00825**	-0.0118***	0.0490***	0.0348***	-0.0511***	-0.0223***
	(0.0029)	(0.0029)	(0.0036)	(0.0034)	(0.0043)	(0.0029)	(0.0043)	(0.0051)
Age	0.00367***	-0.00501***	0.00247***	-0.00117**	0.00181***	0.00127***	0.00212***	0.000393
	(0.00043)	(0.00042)	(0.00053)	(0.00052)	(0.00064)	(0.00043)	(0.00061)	(0.00074)
Ownership								
Proprietary	-0.0459***	0.0503***	-0.0677***	0.0474***	0.0642***	-0.0240*	-0.0562***	-0.119***
	(0.013)	(0.013)	(0.016)	(0.015)	(0.019)	(0.013)	(0.019)	(0.022)
Woman	0.00449	0.0231*	0.0771***	-0.0303*	0.00112	0.0453***	0.00663	0.0276
	(0.014)	(0.014)	(0.017)	(0.018)	(0.021)	(0.014)	(0.020)	(0.024)
Knowledge Source								
Abroad	-0.179***	0.0815*	0.0978*	-0.0626	0.00305	-0.0930**	0.0693	-0.0718
	(0.044)	(0.044)	(0.054)	(0.050)	(0.063)	(0.044)	(0.062)	(0.079)
Domestic	-0.0487***	0.0766***	0.0313**	0.103***	0.0806***	0.0995***	0.146***	-0.00938
	(0.011)	(0.011)	(0.014)	(0.013)	(0.017)	(0.011)	(0.016)	(0.020)
Power Source								
Coal	0.147***	0.0111	-0.0561*	-0.314***	-0.179***	-0.134***	0.0357	-0.0143
	(0.025)	(0.024)	(0.029)	(0.044)	(0.038)	(0.024)	(0.037)	(0.042)
Oil	0.0790**	0.0766**	0.179***	0.0181	-0.160***	-0.0751**	-0.0801	-0.140**
	(0.038)	(0.038)	(0.044)	(0.062)	(0.060)	(0.037)	(0.059)	(0.069)
LPG	-0.0245	-0.0228	-0.00432	0.482***	-0.0950	-0.150***	0.0420	0.0363
	(0.038)	(0.039)	(0.044)	(0.053)	(0.058)	(0.038)	(0.054)	(0.064)
Electricity	0.0341	-0.0257	-0.156**	0.370***	-0.234**	-0.00990	0.233***	-0.0703
	(0.056)	(0.055)	(0.069)	(0.080)	(0.097)	(0.054)	(0.076)	(0.099)
Non Conventional	0.0529**	-0.0647***	-0.144***	0.958***	-0.0798**	-0.229***	0.0926***	-0.0640
	(0.023)	(0.022)	(0.027)	(0.039)	(0.035)	(0.022)	(0.035)	(0.039)
Firewood	-0.291***	0.174**	-0.0166	0.173*	-0.238**	-0.222***	-0.0212	-0.0256
	(0.072)	(0.074)	(0.082)	(0.10)	(0.11)	(0.070)	(0.099)	(0.12)
Firm Characteristics								
Rural	-0.0324***	0.00473	0.108***	0.183***	-0.0498***	-0.0526***	0.0893***	0.0347**
	(0.0097)	(0.0096)	(0.012)	(0.012)	(0.015)	(0.0096)	(0.014)	(0.017)
Export	-0.0319	-0.1000**	-0.000730	-0.189***	0.160***	-0.0785*	0.154**	-0.0170
	(0.042)	(0.042)	(0.054)	(0.051)	(0.054)	(0.043)	(0.060)	(0.072)
Industry & Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.455***	0.508***	-1.124***	-1.399***	-2.342***	-0.709***	-0.722***	-1.494***
	(0.051)	(0.050)	(0.062)	(0.065)	(0.078)	(0.050)	(0.074)	(0.089)
Observations	96743	96752	96674	96674	96574	96747	96527	96726

PAPERS on Economics & Evolution #0808